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ABSTRACT

There is overwhelming evidence that children's first words are primarily nouns even across languages. These data are interpreted as evidence of a "Natural Partitions Theory," one that holds that the concepts referred to by nouns are conceptually more basic than those referred to by verbs or prepositions. Analysis of data from cross-linguistic studies designed to eliminate nonconceptual differences between words in a language that might account for the earlier acquisition of nouns--such as the position of a word in the sentence, morphological transparency (the ease with which the root can be heard in various uses of the word), and patterns of language teaching strategies--leaves some version of the Natural Partitions hypothesis as the most reasonable view of early vocabulary acquisition. A cross-linguistic examination of a single sentence suggests that if objecthood is created by spatial relations among perceptual elements, then good concrete objects are particularly cohesive collections of percepts. These highly cohesive collections of perceptual information tend to be lexicalized as nouns by almost every language. Object concepts are given to language users by the world and can be learned one at a time, while predicate concepts form a system in each language, that, from a child's point of view, must be discovered. (HTH)

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Technical Report No. 257

WHY NOUNS ARE LEARNED BEFORE VERBS: LINGUISTIC RELATIVITY VERSUS NATURAL PARTITIONING

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Why Nouns are Learned Before Verbs: Linguistic Relativity Versus Natural Partitioning

It is often reported that children's first words are primarily nouns (Gentner, 1978a; Macnamara, 1972; Nelson, 1973). This has been interpreted as evidence that the concepts referred to by nouns are particularly accessible to infants: They are different from, and conceptually more basic than, the concepts referred to by verbs or prepositions. This is a position with a long history. As far back as Aristotle, we find arguments that the kinds of things denoted by nouns are different from, and more fundamental ontologically than, the kinds of things denoted by verbs (Book Zeta, Chapter 1, quoted in Alston, 1964):

> And so one might even raise the question whether the words "to walk," "to be healthy," "to sit," imply that each of these things is existent, and similarly in other cases of this sort; for none of them is either self-subsistent or capable of being separated from substance, but rather if anything, it is that which walks or sits or is healthy that is an existent thing. Now these are seen to be more real because there is something definite which underlies them (i.e., the substance or individual) which is implied in such a predicate; for we never use the word "good" or "sitting" without implying this [p.2].

This position, which I will call the Natural Partitions

hypothesis, holds that: (1) the linguistic distinction between nouns and predicate terms, such as verbs and prepositions, is based on a preexisting perceptual or conceptual distinction between concrete concepts such as persons or things and predicative concepts of activity, change-of-state, or causal relations; and (2) that the category corresponding to nouns is, at its core, conceptually simpler or more basic than those corresponding to verbs and other predicates.[1] This intuition is supported by the universality of the noun/verb distinction in language (Hockett, 1960, 1968). As Sapir (1944) says, "No language wholly fails to distinguish noun and verb, though in particular cases the nature of the distinction may be an elusive one. It is different with the other parts of speech. Not one of them is imperatively required for the life of language [p. 119]." The noun/verb distinction is also basic in American sign language, a manual-visual language (Supalla & Newport, 1978), and it emerges early as an important distinction in pidgins and creoles (Slobin, 1975).

The position that nouns and verbs have different conceptual bases is an attractive one. However, it is quite possible that this seeming conceptual difference is really an illusion foisted on us by our language. Simply because language makes a communicative distinction, albeit an important one, is no guarantee that correlates exist in the perceptual world. This counterview, stated eloquently by Whorf (1956), is called Linguistic Relativity: that it is language that sets up the

distinctions between parts of speech, and that each language is free to do so differently, with no underlying conceptual constraints. Whorf's stronger hypothesis, called Linguistic Determinism, is that these linguistic distinctions cause us to read into the world corresponding perceptual distinctions:

> Segmentation of nature is an aspect of grammar -- one as yet little studied by grammarians. We cut up and organize the spread and flow of events as we do, largely because, through our mother tongue, we are parties to an agreement to do so, not because nature itself is segmented in exactly that way for all to see... English terms, like 'sky, hill, swamp,' persuade us to regard some elusive aspect of nature's endless variety as a distinct thing, almost like a table or chair. Thus, English and similar tongues lead us to think of the universe as a collection of rather distinct objects and events corresponding to words. (Whorf, 1956, p.240)

Does language follow some natural perceptual segmentation of the world or does our segmentation of the world follow language? Because both views would predict agreement between linguistic categories and conceptual categories, we cannot use adult intuitions to decide between them. However, it is possible that learning patterns among children experiencing a language for the first time may more directly reveal the influence of the perceptual world on language.

Evidence from Children's First Words

An infant learning language has two streams of information: the ongoing stream of perceptual-cognitive information about the world around, and the stream of language being spoken. The child's task, in learning word meanings, is to somehow match up these two streams. Suppose that some collections of perceptual information are particularly easy to separate from the world stream, perhaps because they are more salient, or more stable, than the general stream of percepts. Then children should learn the words for these concepts first, all else being equal, because half of the problem is already solved; it only remains to match up the concept with the appropriate part of the speech stream. According to the Natural Partitions hypothesis, these particularly stable concepts are just those considered to be objects and lexicalized in adult language as nouns; thus children's first words should be predominantly nouns.

If early words show a random distribution across form classes, the Natural Partitions hypothesis as stated here will be untenable. At a minimum, such a pattern would suggest Linguistic Relativity: that form class distinctions do not reflect prior perceptual distinctions; and it would invite investigation of whether the stronger form of Whorf's hypothesis, Linguistic Determinism, might also hold: that form class distinctions themselves lead us to believe in corresponding conceptual

categories. The opposite finding, that nouns are acquired earliest, could be supportive of the Natural Partitions hypothesis. However, care must be exercised here: there could be purely linguistic factors that would cause one form class to predominate in early word learning. Thus, even if regularities in vocabulary acquisition are found, we must first rule out the possibility that the source of these regularities lies in the language itself - its patterns of word order, of stress, and so on - before accepting the Natural Partitions hypothesis.

Some kind of cognitive determinism view is implicitly the dominant view among developmental psychologists and psycholinguists. The general assumption that children's early language learning utilizes preexisting cognitive structures is widely shared (Anglin, 1977; Bates, 1976; E. V. Clark, 1973, 1979; H. H. Clark, 1973; Dore, 1975; Greenfield & Smith, 1976; Grieve & Hoogenraad, 1979; Huttenlocher, 1974; Macnamara, 1972; Nelson, 1974; Piaget, 1963; Sinclair-de Zwart, 1969; Slobin, 1973; Vygotsky, 1962). For example, Macnamara (1972) is quite close to the specific claims of the Natural Partitions hypothesis in proposing that cognitive difficulty predicts the order of acquisition of different kinds of word meanings, with object reference as the simplest and earliest meaning. He predicts an order of acquisition as follows: names for entities, names for their variable states and actions, and names for more permanent attributes.

The opposing view, that form class is learned independently of conceptual structure, has been vigorously argued by Maratsos and Chalkley (in press). Maratsos and Chalkley argue that any attempt to define form classes semantically is doomed to failure, because there are counterexamples to the conceptual-syntactic mapping in both directions. Going from form class to conceptual categories, for every possible semantic description of a form class one can find exceptions; i.e., words that belong to the class but do not satisfy the semantic description. For example, if verbs denote often-voluntary actions and processes such as changes of state--e.g., "break" or "melt"--and adjectives denote more or less enduring, often involuntary states and dispositions--e.g., "cold" or "red"--then why are statives such as "know," "have," and "comprise" classified as verbs? In the other direction, one can find cases in which the same semantic concepts are mapped into two different form classes--e.g., "make noise"/"be noisy;" "like"/"be fond of."

We will return to these issues later, but for now two points should be noted. First, the existence of a small number of counterexamples invalidates a logical category, but does not necessarily disprove the existence of a psychological category. In Rosch's (1975) work, for example, people think of robin-like forms as their prototype birds, even though they also believe that ostriches are birds. The evaluation of a putative category thus becomes more complicated. We need to ask not whether there exist any counterexamples, but whether the degree of central

tendency, of shared attributes within categories and nonshared attributes between categories, is sufficient to form a healthy natural concept. The second point to notice is that Maratsos and Chalkley's perceptive analysis of counterexamples relies heavily on crossovers between the various predicate form classes, such as verbs and adjectives, and not between object-reference terms and predicate terms.

The Maratsos and Chalkley position is that form class is a matter of syntactic privilege; they are skeptical of the existence of conceptual correlates. Any asymmetries in acquisition should therefore be accountable for by linguistic factors, such as distributional regularities. Thus, the predictions for early vocabulary acquisition are drawn. The Natural Partitions hypothesis predicts that terms denoting objects and entities will be acquired first across languages and that these terms will be nominals. Linguistic Relativity positions, such as the Maratsos and Chalkley position, predict either that there will be no particular order of acquisition of nominals versus predicates, or that, if such an order exists, it can be accounted for by purely language-based differences between the two categories.

Our first step, in evaluating these positions is to examine the distribution of children's first words across form class. Note that we are concerned here with adult form class. The Natural Partitions hypothesis makes no claim that these early

object-reference words are conceived of as nouns by the children; merely that they tend to be words that are considered nouns in the adult grammar. To claim that these words function as nouns for the child would require assigning form-class distinctions at the one-word stage, before the child has clearly demonstrated any such knowledge.

More fundamentally, the question of how (or whether) children syntactically categorize their early words is irrelevant to the Natural Partitions hypothesis. The prediction of early noun acquisition is derived from two conceptually-based assumptions. The first assumption is that certain concepts--namely, concrete object concepts--tend to be lexicalized as nouns in adult languages. The second assumption is that these same object concepts are particularly easy for children to grasp as cohesive concepts, separate from the general perceptual milieu. Assumption (2) predicts that children should learn the names for object-reference concepts early. By assumption (1), these turn out to be nouns in adult language. Their syntactic role for the child is not at issue.

The plan of the paper is to present early vocabulary acquisition, first in English and then in other languages, indicating early acquisition of nouns; then to consider various language-based factors that might account for the patterns observed; and finally, having ruled out a purely linguistic account, to accept the Natural Partitions hypothesis, and to speculate on its underlying causes.

Acquisition of English Vocabulary

A Case Study of Early Production. It is a common observation that children learning English acquire nominals earliest. Table 1 shows the set of first words learned by Tad, an American-English-learning boy whose vocabulary acquisition was closely observed by both his mother and the author. The words are divided into four primitive categories of word meaning: nominal terms, which have the function of object reference, and include both what adults would call common nouns and what adults would call proper nouns; predicate terms, which refer to actions, changes of state, or other predicate notions, and include what adults would call verbs, prepositions, and modifiers; expressive terms, which function either directly to express a feeling (e.g., "ouch") or as part of a ritual (e.g., "bye-bye"); and finally, indeterminate terms, which have ambiguous or multiple usage. (An example of an indeterminate word is "pee," which, because it was used when the child was urinating, could have been either a nominal, referring to the urine, or a predicate, referring to the act of urinating or to the change of state from dry to wet.)

The pattern of acquisition shown here conforms to the predictions of the Natural Partitions hypothesis. The words learned earliest (at 11 to 13 months) were nominals referring to objects, e.g., "Daddy," "dog," "duck." Verb-like terms entered considerably later. Only one word acquired in the first 16 months could possibly be considered a predicate: the word "yuk."

Table 1

Order of Acquisition of Words by an English Speaking Boy, Tad

Age	Nominal	Indeterminate	Predicate	Expressive
11 mo.	dog			
12 mo.	duck			
13 mo.	Daddy		yuk	
	Mama			
	teh (teddy bear)			
	car			
14 mo.	dipe (diaper)	toot toot (horn)		
	owl			
15 mo.	keys			
	cheese			
16 mo.	eye			
Total: 13				
No. (Prop.)	11 (.85)	1 (.08)	1 (.08)	0
18 mo.	cow	bath	hot	
	cup			
	truck			
19 mo.	kitty	pee pee	happy	oops
	juice	TV	down	boo
	bottle		up	hi
	spoon			bye
	bowl			uh oh
	towel			

Table 1 Continued

Age	Nominal	Indeterminate	Predicate	Expressive
19 mo.	apple			
	teeth			
	cheek			
	knee			
	elbow			
	map			
	ball			
	block			
	bus			
	jeep			
Total: 44				
No. (Prop.)	30 (.68)	4 (.09)	5 (.11)	5 (.11)
21 mo.	toe	back(piggy-back ride)	stuck	
	happy sauce (apple sauce)		off	
	moon		down	
	bee			
	tree			
	bird			
	pole			
	wheel			
	water			

Table 1 Continued

Age	Nominal	Indeterminate	Predicate	Expressive
21 mo.	cookie			
	peach			
Total: 60				
No. (Prop.)	41 (.60)	5 (.08)	9 (.15)	5 (.08)

Even this might better have been considered an expressive term at this stage, because it was used as an exclamation when Tad encountered food that he didn't like. I have counted it as a predicate because it was later used as a modifier in combination with other words--for example, "that yuk." Thus, the most generous count would give only one predicate term by the age of 16 months. Two further modifier-like predicates--"hot" and "happy"--were acquired at 18 and 19 months. Only then, at 19 months, 10 months after the first nominals, did the first verb-like predicates--"down" and "up"--appear. Their early uses, though restricted, clearly involved changes of state.[2] "Down" was used when Tad wanted to be taken out of his highchair, and "up" when he wanted to be picked up and held.

Nouns are the predominant early forms; moreover, only a subset of the possible noun types occurs. We find no names of collections, such as "forest;" no abstract nouns, such as "joy;" and very few mass nouns (although "milk" does appear). The set of words first learned contains chiefly names for individual objects and beings. Even apparent class names were often in practice names of entities. For example, the first word, "dog," referred to a particular dog, Tad's grandparents' pet. The second word, "duck," referred to a small ceramic object (actually a chicken) that sat on the kitchen table. About a month later, with considerable prompting, it was applied to live ducks in a pond. "Daddy" and "Mama" were at first used only for the appropriate individuals, although "Daddy" was very soon

generalized to another similar-appearing man. "Teddy" (Teddy Bear) was used for a picture of a teddy bear on the back of Tad's highchair, and for no other purpose: it, too, was the name of an individual entity.

Generality of the Early Production Patterns in English. The pattern of early acquisition of object-reference terms is quite robust in English. Greenfield and Smith (1976), in longitudinal observation of two children from their first one-word utterance until the stage of combining words, found the same pattern: The earliest clearly linguistic word uses were referential uses of nouns--for example, "dada," looking at father, at 7 or 8 months. For both children, the earliest relational predicate was "down," occurring at 13 or 14 months of age. The first true verbs, "eat" and "bay" (play), entered at 16 and 20 months, respectively. Again, three children studied by Huttenlocher (1974) all learned nouns before verbs. Early diary studies by Dewey (1894) and Tracy (1893) show the same pattern. In each of these case studies, nouns entered the production vocabulary before verb-like words.

As a final piece of evidence on early production vocabularies, Table 2 shows data from eight children studied by Katherine Nelson (tabulated from Nelson, 1973). The set of the first eight-to-ten words learned by these children shows a strong preponderance of nouns that refer to concrete objects and to individuals.

Table 2

The first words learned by eight children (from Nelson, 1973).

S	Nouns (Total)	Proper Nouns	Common Nouns	Predicates	Expressives	Other	Total
1	8	Daddy, Mommy, Daniel	girl, ball, school, cracker, cookie		bye	that	10
2	6	Daddy, Momma, Papa	boat, truck, map	sit		this, um	9
3	8	Daddy	duck, ball, apple, doggie, kitty, donkey, bottle	bow wow	thank you		10
4	6	Daddy, Mommy, Nana	doggie, dolly, milk	go-go	hi, hi there		9
5	5	Daddy, Mommy, Daisy	puppy, ball	see	hi, yes	where	9
6	4	Mommy, Daddy	woof-woof, ball		hi	there, hot dirty	8
7	5	Ma	dog, milk, car, water		bye bye, no	here	8
8	6	Daddy, Mommy	dog, cat, tiger, milk		hi, no		8
Totals:	48	18	30	4	11	8	71
Means:	.68	.25	.42	.06	.15	.11	

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There is a considerable amount of overlap among these children. Again we find names of individuals (for example, "Mommy"), names of animals, and names of small objects, such as "map," "bottle," "ball." We also find names for mobile objects, such as "cars;" and for food, such as "apple." As described with Tad, it is possible that some of the common nouns, which for adults refer to any member of a class of objects, are in fact used to refer to individual objects at the outset. One thing that seems to be clear is that referential terms, whether for individuals or for basic-level classes, form a large part of a child's first linguistic gains in English.

Patterns of Comprehension and Production in English. The data so far presented are all production data. Fortunately, there is a controlled study by Goldin-Meadow, Seligman, and Gelman (1976), which compared the production and comprehension for nouns and verbs of children aged 8 months to about 2 years, 2 months. The children were interviewed at irregular intervals over about 3 to 4 months, and at each interview were asked both to name objects and actions (production) and also to point to objects or to act out actions that were mentioned by the experimenter (comprehension). Data from this study are shown in Table 3.

There are two main points to notice here. First, expectably, production lags behind comprehension for all children in all age ranges, and for both word classes. Second, within

Table 3

Number of Words Comprehended and Produced by Three English-speaking Children (adapted from Goldin-Meadow, Seligman & Gelman, 1976)

Child and Age (mos. & weeks)		Number of Words Comprehended		Number of Words Produced	
		Nouns	Verbs	Nouns	Verbs
Lexie	22.0	35	22	7	0
	24.2	58	26	17	0
	25.0	58	27	28	3
	25.1	61	27	40	7
Melissa	19.1	22	14	5	0
	22.1	40	16	9	0
	22.0	46	not recorded	29	not recorded; some produced
Jenny	14.0	27	9	10	0
	16.0	33	14	19	0
	17.0	38	18	29	4
	17.1	45	18	34	6

either production or comprehension, verbs lag well behind nouns. The first child, for example, began by producing no verbs at all and comprehending fewer than 10 verbs. At the same time, this child was producing about 10 nouns and comprehending almost 30 nouns. At the close of the study, the child produced about five verbs and comprehended about 18 verbs, but still showed greatly superior performance with nouns, producing 32 nouns and comprehending 48 nouns.[3] Thus, the result that simple nouns precede simple verbs in the child's vocabulary is supported for comprehension as well as production.

It seems that English-speaking children learn nouns, and particularly nouns whose referents are simple objects or individuals, before they learn predicate terms. This evidence so far is compatible with the Natural Partitions position. However, before we can make any real headway we need to know whether this pattern is general across languages.

Cross-linguistic Vocabulary Acquisition

To discover whether the pattern of early acquisition of nominals holds outside English, let us now compare early vocabularies for children learning German, Kaluli, Japanese, Mandarin Chinese, and Turkish, as well as English.

Ideally, one would like to have had complete daily journals, kept by assiduous linguistically and psychologically sensitive full-time caretakers, for children in each language. We do not

have anything close to this for most of the languages considered. The researchers who kindly provided the early-vocabulary data for non-English languages were in general working on different issues and in some cases had to derive the vocabulary data from corpora collected for other purposes. The methods of data collection are described in detail in Appendix A. There were three basic methods: (1) retrospective reports, in which parents were asked to write out their children's entire vocabularies; (2) journals, in which parents or other caretakers kept on-going vocabulary lists; (3) sample transcriptions, in which the vocabularies were taken from transcriptions of sessions with the children. The retrospective report method was used for Japanese and German children. The journal method was used for the English children, (except the child called Dewey A.), with varying frequencies of updating. The transcription method was used in Kaluli (source: Bambi Schieffelin), Mandarin Chinese (source: Mary Erbaugh), and Turkish (source: Dan Slobin; original source: Nail Sahin). The manifest deficiencies of this variety of source types must be considered as a limitation on the strength of the conclusions. Nevertheless, because there is no reason to suppose that these data are biased with respect to our hypotheses, they can be taken as representative.

Table 4 shows the pattern of form-class acquisition for children of six different languages.

There is overwhelming agreement among these different

Table 4

Proportions of Form Classes in Early Vocabularies

Language	Child	Age	Sex	Total No. of Words	Proportion of Form Classes			
					Nominals	Predicates	Expressives	Indeterminate/Other
Mandarin-Chinese	Ming Ming	1-5	M	20	.65	.30	0	.05
	Xiao Jing	1-6	F	37	.59	.24	.02	.14
Japanese	Masatsugu	2-5	M	15	.73	.13	.07	.07
	Mikiko	2-0	F	16	.81	.13	0	.06
	Shunsuke	1-2	M	19	.68	.26	.05	0
	Sayaka	1-11	F	110	.69	.25	.07	.05
Kaluli	Suella	1-8	F	16	.50	.31	.06	.13
	Wanu	1-11	M	54	.61	.20	.11	.07
German	Johannes	1-6	M	4	.50	0	.50	0
	Martin	1-8	M	33	.67	.27	.03	.03
English	Tad	1-4	M	13	.85	.08	0	.08
	Mollie	1-2	F	39	.69	.13	.13	.05
	Scooter	1-10	M	79	.75	.11	.08	.06
	Dewey A.	1-7	M	115	.60	.35	.05[a]	0
Turkish	Turkish 1	1-2	F	27	.71	.18	.04	.07
	Turkish 2	1-4	F	42	.57	.24	.07	.12

languages in the basic pattern that first-word acquisition is concentrated among nominals. The figures range from 50% of the first vocabulary for a Kaluli-speaking child to 85% for an English-speaking child. Moreover, in every case, the proportion of nominals solidly outweighs the proportion of predicate terms.

The crosslinguistic finding that nominals--especially nominals that seem to point to real-world referents--are acquired before predicates appears to support the Natural Partitions hypothesis, but it is still not decisive. For, if we return to the notion of the child as matching up two streams of information, the early acquisition of nouns could result either from differences in the conceptual flow (the Natural Partitions hypothesis) or from differences in the stream of language. It is possible that nominals, as a form class, tend across languages to be treated in such a way as to make them particularly accessible in the linguistic stream. Slobin and his colleagues have repeatedly demonstrated the importance of characteristics of language--such as the perceptual salience of a given morpheme, or its place in the utterance--in determining ease of acquisition (e.g., Johnston & Slobin, 1978; Slobin, 1973, 1975). If it should be the case that the words a language chooses to treat as nouns tend to be treated differently in the flow of language than words considered to be verbs or prepositions, then differences in linguistic accessibility could be a sufficient explanation for the early acquisition of nouns.

Our first step is, therefore, to examine the words acquired earliest in more detail, to decide whether these form-class patterns do in fact correspond to similarities in the kinds of real-world objects referred to. Our second step is to compare purely linguistic factors, to see whether commonalities in acquisition can better be accounted for within language. The Natural Partitions hypothesis will be supported to the extent that children's first words share meanings (or classes of real-world referents) across languages. The Linguistic Relativity view will be supported to the extent that children's first words share purely linguistic characteristics.

Table 5 shows, for one child from each of the six languages studied, the set of first words in the sample.

Conceptual Commonalities

The referential commonalities are impressive. We find large numbers of proper nouns (such as "Mama," "Aunt," and "Daibo"). There are also a large number of names for animate beings (e.g., "baby," "dog," and "pig"); for food (e.g., "milk," "banana," and "cooked rice"); and for small, well-defined movable objects (e.g., "ball," "shoe," and "sock"). Terms for vehicles, such as "car" or "bus," are not so common universally, perhaps because some of the cultures (certainly at least the Kaluli of New Guinea) receive less exposure to vehicles than others. Terms for toys, body parts, and clothes occur in more than one language

Table 5

First Words Spoken by Children, as Reported by Parents; Including Numbers (Proportions) of Nominals, Predicates, Expressives and Indeterminate Terms

Language:	German	English	Turkish	Japanese	Kaluli	Mandarin
Child:	Martin	Mollie	Turkish 2	Masatsugo	Suella	Xiao-Jing
Sex:	Male	Female	Female	Male	Female	Female
Age & Voc. Size	1-8(33)	1-2(39)	1-4(42)	2-5(15)	1-8(16)	1-6(37)
NOMINALS:	22(.67)	27(.69)	24(.57)	11(.73)	8(.50)	22(.59)
Proper Nouns:						
Individuals:	Mommy	Mommy	Mama	Mommy	Mother	Mommy
	Papa	Daddy	Daddy	Daddy	Daibo	Papa
	Gaga	Babar	Aba	Grandmother	Abi	Grandmother (paternal)
	Geli	Aba	Dayim	Grandfather	Waye	Aunt
			Nejati		Mage yo	Grandfather
			Auntie		Magey	Cousin
			Name of someone		Bambi	Grannie
						Uncle
						Gu (aunt)

Table 5 Continued (2)

Language:	German	English	Turkish	Japanese	Kaluli	Mandarin
Common Nouns:						
Animate beings:	baby	baby	baby	mouse	pig	horse
	dog	dog		dog		chicken
	bird	dolly		cat		
	cat	kitty				
		girl				
		bear				
Food:	milk	milk	food	water		uncooked rice
	juice	apple juice	pacifier	lunch/dinner		cooked rice
	cheese	cheese	banana			noodles
	breakfast	raisin	chocolate			orange
		bottle	bread			
		cracker	sugar			
		egg	cake (1)			
			cake (2)			

Table 5 Continued (3)

Language:	German	English	Turkish	Japanese	Kaluli	Mandarin
Toys:	ball	book	ball			
Clothes:		shoe	shoe			
		sock	sock			
Body Parts:	nose	eye				
Vehicles:		car		car		
		choo choo				
		bus				
		truck				
Other:	moon	moon	pencil	spoon		flower
	stars	star	towel			red envelope
	tree		mirror			hand clock
	sea		radio			wall clock
	light					lamp
	nail					electric cord
	leaf					TV
	newspaper					

Table 5 Continued (4)

Language:	German	English	Turkish	Japanese	Kaluli	Mandarin
PREDICATES:	9(.27)	5(.13)	10(.24)	2(.13)	5(.31)	9(.24)
Verb Type:						
Action:	cry	run	cry			
			stir-stir			
			beat (w/fork)			
Change-of-State:	come	all gone	come	go	all gone	go
		more	put on		more	come
		down	all done		give	go (to work)
Action plus						
Change-of-State:	eat	eat	eat		eat	pick up, walk
	sleep		went pooh			
	get up		wash			
	spill					
	clean					
Experience:	want		want	want	want	not want
						afraid
Stative:	hot					correct

Table 5 Continued (5)

Language:	German	English	Turkish	Japanese	Kaluli	Mandarin
Stative:						be at work
						not yet
EXPRESSIVES:	1(.03)	5(.13)	3(.07)	1(.07)	1(.06)	1(.02)
	no	no	hello	no	no	thank you
		hi	good-good			
		thanks	bleble (pulling ears)			
		bye bye				
		please				
OTHERS, MULTIPLE OR INDETERMINATE:	1(.03)	2(.05)	5(.12)	1(.07)	2(.13)	5(.14)
	doo doo	doo doo	outside	writing	there,	pee
		pee pee	where pencil		that	
			cover		(emphatic)	
			bugum-buve		this	1, 2, 3, 4
			(phrase said when thirsty)			
			not			

sample but are not universal. These categories of nominal reference accord fairly well with the nominal categories Nelson (1973) found in her study of children's early vocabularies in English (see Table 2). Besides proper nouns (including Mommy and Daddy), Nelson found food, animals, toys, and also body parts, vehicles, and other objects.

Predicate terms are far less represented in the early vocabularies. But here again we find considerable commonality. The early predicates are in most cases either simple change-of-state terms, such as "allgone," "more," "go," or "down;" or else action plus change-of-state terms (what Chafe, 1970 would call action-process verbs), such as "spill," "pour," or "eat." There are also some predicates that refer to experiential states of the speaker, such as "want." Finally, there are a smaller number of expressive terms, such as "no," "thank you," as well as some indeterminant terms. These patterns, particularly the referential patterns, are stable enough to provide support for the notion that cognitive categories are the basis for first-word acquisition.

Possible Language-Based Explanations

So far, we have examined the first part of the language-and-thought question. There do indeed seem to be conceptual commonalities among the first words children learn. The second part of the question is whether there are nonconceptual, language-based commonalities among the first words that could

also account for the acquisition order. There are a number of nonconceptual differences between the words in a language that might, if they systematically varied, account for earlier acquisition of one sort of word than another. Word frequency, position in the sentence, and morphological transparency are prime candidates. We evaluate each of these in turn. The first possible explanation, frequency of exposure, can be reasonably well evaluated within English. The others require crosslinguistic comparisons.

Frequency. The frequency explanation would be that children learn nouns first because nouns are more frequent in the speech that they hear. This possible argument runs into trouble immediately, because, at least in adult speech, the opposite frequency patterns occur. Adults use a large number of nouns, each fairly infrequently, and a smaller number of verbs, each much more frequently. In the class of most-frequent words spoken, verbs and other predicate terms greatly outnumber nouns; In a sample of the 100 most-frequent words in the Kucera and Francis (1967) one-million-word corpus of written language, 20% are verbs (including auxiliaries) and only 6% are nouns. Prepositions constitute 14%, and pronouns and other function words 39%. If word frequency were the sole determinant of vocabulary acquisition, children would learn verbs and prepositions before they learned nouns; and they would learn certain grammatical terms, such as "the" even earlier. Yet we have seen that verbs are acquired after nouns, and function words are acquired even later (Brown, 1973).

Perhaps, though, this table of written frequencies does not reflect the frequencies of spoken speech. Table 6 shows the frequencies of words used in telephone conversations, as recorded by French, Carter, and Koenig (1930) (quoted in Miller, 1951). Similar patterns occur; the most-frequently used words are grammatical terms of various kinds, and among content words, nouns are less frequent than verbs and prepositions. Looking at column 5, we see that a child listening to this conversation would hear many more repetitions of a given verb than of a given noun, on the average. If these production frequencies are a reasonable approximation of the frequencies heard by children, then a frequency-of-exposure argument again makes the wrong prediction: Verbs ought to be acquired before nouns.

An important limitation here is that these frequency distributions are for communications between adults. Speech to young children differs rather strongly from speech among adults (See, for example, Newport, Gleitman, & Gleitman, 1977; Snow, 1977). Perhaps word frequency patterns differ from those of adult speech. For example, in speech to children adults might use a small number of nouns, each more frequently, than they do in speech to other adults. Without precise descriptions of the parents' input to children, we cannot definitively rule out the possibility that these early nouns are simply the words spoken most frequently to children. However, one piece of counter evidence is that in the Newport et al. (1977) investigation of motherese, no correlation was found between the frequency of

Table 6

Occurrence of Parts of Speech in Telephone Conversation,

from French, Carter and Koenig, 1930 (quoted in Miller, 1951)

Parts of Speech	Tokens	Number (Proportion) of words (Prop.)	Types	(Prop.)	Token-type ratio
Nouns	11,660	.15	1,029	.46	11.33
Adjectives and adverbs	9,880	.12	634	.28	15.58
Verbs	12,550	.16	456	.20	27.52
Auxiliary verbs	9,450	.12	37	.02	255.41
Prepositions and conjunctions	12,400	.16	36	.01	344.44
Pronouns	17,900	.23	45	.02	397.78
Articles	5,550	.07	3	.001	1850.00
Totals	79,390		2,240		35.44

maternal use of deixis (for example, "That's an apple.") and the child's rate of learning of the nouns that occurred in the phrases, even though the noun is generally the only content word in such a deictic. Interestingly, maternal use of deixis did correlate positively with one measure of children's learning: their number of inflections per noun. As Newport et al. remark, this is one of many instances in which it has been possible to show correlations between mother's speech and the child's surface syntax, but not the child's semantic content.

There is a deeper problem, however. Even if we were to find that the nouns learned earliest were just those words used most frequently in motherese, we would not know the direction of causality: Do children learn certain kinds of words because their parents say them a lot, or do their parents say certain words because their children find them easy to understand? What is really needed here is a planned manipulation of frequency of mention. Here, a small but telling study by Wick Miller is relevant (reported in Ervin-Tripp, Note 4). Miller played a game involving plastic beads with a two-year-old child for a period of about a year. He made up artificial words for the elements of the game, so that he knew exactly how many exposures occurred before the child produced each word. The noun "po" was used for beads of a particular kind, and the verb "to sib" for actions of a particular kind. The child first used the noun at age 2;2, after 67 inputs; the verb was not used until 8 months later, after 164 inputs. Well over double the number of exposures was

required for the verb. Thus, although exposure frequency probably plays some role, it is not an adequate explanation for the form-class ordering in vocabulary acquisition.

Word Order. A second linguistic factor that might determine ease of acquisition is the position of the word in the sentence. Based on crosslinguistic comparisons, Slobin (1973, 1975) has postulated a number of operating principles that appear to govern children's language-learning strategies. One of these is that children pay attention to the ends of words. Items in final position are more likely to be acquired early than items in initial position. Suffixes are acquired earlier than prefixes, and postpositions earlier than prepositions. Extending this principle to sentences, this suggests that whichever form class tends to occur at the ends of sentences in a given language should have a linguistic advantage in acquisition. In English, the normal word order is subject-verb-object, which leaves nouns at the end of the sentences. The noun-final order may be even more pronounced in some kinds of speech to children. Messer (in press) taped mothers interacting with their fourteen-month-old children in a toy room; he found that names of toys were the most likely to occur at the end of the utterance, and (probably not independently) to be the loudest items in the sentence. Of course, the mere fact of noun-final and even noun-stressed sentences does not tell us whether the children were more likely to acquire these nouns. (See the Newport et al. [1977] study previously mentioned.) Still, it could be argued that children

learn nominals first in English only because they occur last in the typical sentence.

The crosslinguistic patterns tend to argue against final position as a general explanation of the early acquisition of nominals. At least three, and probably four, of the languages considered here have verb-final word orders. Japanese and Turkish are SOV languages; Kaluli has both SOV and OSV order; and German, which can have both SVO and SOV order, probably features a preponderance of verb-final sentences in language to children.[4] If final position were the determinant of acquisition priority, verbs would be acquired first in these languages. Yet, as Table 4 shows, nouns predominate over verbs in these four languages. As a rough quantitative measure, the mean proportion of verbs in the early vocabularies averaged over the four verb-final languages is identical to that for the two SVO languages, English and Mandarin (.20 for both groups, with ten children learning the verb-final languages and six children learning the SVO languages). Word order, then, seems not to be the explanation for the order of form class acquisition.

Morphological Transparency. The child's task of mapping ideas onto language is easier to the extent that the mapping between morphological units and underlying meanings is regular and clear (Slobin, 1975). Another possible nonconceptual explanation for the early acquisition of nouns is differences in morphological transparency: the ease with which the root can be

heard in the various uses of the word. For example, in English, noun inflections are restricted to the singular-plural distinction and the possessive; verb inflections include tense, person, number, and some aspect inflections, such as the progressive. Thus, the child hears only the variants "dog" and "dogs" for a typical concrete noun, but may hear for a verb such variations as "kick," "kicked," "kicking," and "kicks." Perhaps these variations in morphology make it more difficult for the child to isolate the root of the verb, and thus make it more difficult to match the use of this root with the regular occurrence of some real-world event.

There is no clear, agreed-on way to define morphological transparency. However, it seems reasonable that transparency is greater the lower the number and variety of inflections attached to a root and the greater the regularity of expression of the root. Because verbs are more highly inflected than nouns in most languages, on the whole we can suspect that if a language has complex morphology, the verbs will be more complex morphologically than the noun. The languages studied here vary along both their degree of syntheticality-analyticity--i.e., the average number of morphemes per word--and on the regularity of their forms. Turkish is highly synthetic (many morphemes per word), but extremely regular. (It is agglutinative: Affixes are added in a regular fixed order and preserve their surface forms across contexts.) Kaluli is highly synthetic and irregular, with many morphemes that change their phonemic realization with

context. German, Japanese, and English, in increasing order of analyticity, tend towards the analytical end of the continuum of languages. At the extreme end is Chinese, which is among the most analytical of languages, having in the neighborhood of one morpheme per word.

Examining Table 4 again, the first thing to notice is the general observation that nouns outnumber predicates quite strongly in early vocabularies across all these languages. The mean proportions in the two highly synthetic languages (Kaluli and Turkish, averaged together) are .60 for nouns and .23 for predicates. Thus the pattern of nouns predominating over predicates is still quite strong, although not as strong as for the more analytic English-German-Japanese group, which averages .70 for nouns and .17 for predicates.

For our purposes, the key comparison concerns the most analytical of the languages, Mandarin Chinese. For, if the later acquisition of verbs in English and other nonanalytic languages is due to their greater morphological complexity, then this acquisition difference should disappear in Mandarin, which has so few inflections that verbs and nouns are nearly equivalent in morphological complexity. There are a few verb suffixes in Mandarin, which creates a small morphological difference in favor of nouns. But the difference is minimal: There are no root changes, and in many sentences both the main verb and the noun occur without affixes. (See Erbaugh, Note 3, for a more complete

discussion of Mandarin grammar and its acquisition.) Yet Mandarin Chinese still shows the noun-predominant acquisition patterns: The mean proportions are .62 for nouns and .27 for predicates. Because Mandarin does not possess enough inflections to create any sizable form-class differences in degree of morphological complexity, the predominance of nouns here tends to rule out differences in morphological transparency as the explanation for the acquisition patterns.

Patterns of Language Teaching. Another nonconceptual factor that could affect acquisition is cultural patterns of language teaching.[5] Kaluli provides an interesting contrast here. According to the Schieffelin (1979), the Kaluli have little interest in teaching children the names of objects or beings, other than relatives. Moreover, the society is largely nonliterate, so that children are not taught names for pictured objects as in English. Instead, mothers give their children extensive and explicit training in conversational interaction--e.g., requesting, asserting rights, teasing--often by modeling appropriate remarks for the child. For example, a mother tells her two-year-old child to say "Give that back to me." or "Is it yours?" to a cousin who has taken the child's plaything. As Ochs (1979) points out, this situation contrasts strongly with that of the English samples in which object naming--including volunteering, repeating, and asking for object names--is a standard way for adults to interact with children. The other languages sampled are more like English in their language-

teaching patterns. In particular, in the Mandarin community, children are strongly encouraged to talk, and to learn the names of relatives, animals, numbers, and colors, as well as some social routines (Erbaugh, Note 3).

Although it has proved difficult to find direct evidence for effects of mothers' speech on lexical acquisition (for example, Nelson, 1973; Newport et al., 1977), it seems reasonable that parental teaching strategies could affect the kinds of words children learn. In this case we should expect Kaluli children to have relatively few nominals. Indeed, the Kaluli ratio of nominals to predicates (.56 for nouns and .26 for predicates) is the lowest of any of the groups. Consistent with this "cultural-influence" hypothesis, Mandarin and American children show considerably higher proportions of nominals (an average of .69 for nouns and .20 for predicates). Moreover, many of the Kaluli nouns are names of relatives, a culturally approved category for children. However, the noun-predominance effect is still there: Kaluli children still show twice as many nominals as predicates. That this effect persists in Kaluli, despite the pronounced lack of interest in teaching object reference, is evidence that the nominal bias in early vocabularies does not result simply from parents' teaching strategies.

Overall, the nonconceptual factors do not appear to account for the predominance of nouns over verbs in early acquisition. None of the language-based factors--word frequency, position in

the sentence, or morphological differences between nouns and verbs--is adequate to explain the order of form-class acquisition; nor do biases in language-teaching patterns appear to be a sufficient explanation. These factors almost certainly affect acquisition, and perhaps in combination they exert a considerable effect. But the acquisitional asymmetry between nouns and predicates is extremely robust across variations in these nonconceptual factors. This failure to account for the earlier acquisition of nouns by factors internal to language or to language-teaching suggests that at least part of the explanation must lie at the conceptual level.

The Natural Partitions Hypothesis

We are left with some version of the Natural Partitions hypothesis as the most reasonable view of early vocabulary acquisition: that nouns are learned earlier because their referents are more accessible than those of predicates. However, what this invites is a more intensive explanation of why some concepts are more accessible than others. Why do some parts of the human experience form themselves early into stable concepts for which the child can learn lexical labels, while others take much longer to be pulled out of the stream of events and lexicalized? Perhaps object concepts are more accessible than predicative concepts because they are more concrete, more tangible, or higher in imagery. Although there seems something right about these phrases, they aren't completely satisfying.

When we say that object concepts are more concrete or tangible than predicative concepts, are we really saying anything more than that we find them easier to learn? One would like a more analytic account of the conceptual differences. The next section is a discussion of some possible underlying representational differences between object concepts and relational concepts that could lead to the acquisition differences between nouns and verbs.

Cross linguistic Variability in Verb Conflation

Work on componential representation (for example, Bendix, 1966; Bierwisch, 1970; Chafe, 1970; Fillenbaum & Rapoport, 1971; Fillmore, 1971; McCawley, 1971; Postal, 1971; Schank, 1973) has provided evidence for the claim that separable elements of meaning are commonly lexicalized into one surface verb. Talmy (1975, 1978; forthcoming) points out that there is considerable variation across languages as to which meaning elements are considered to fit within the verb and which are left as satellites (for example, verb particles) elsewhere in the sentence.

Talmy's example of motion verbs in Spanish and English is illustrative. As alike as these two Indo-European languages are, still there are differences in the choice of which semantic information to include along with the basic change of location in the verb. Talmy gives the example of a bottle moving on the surface of a stream in the direction of a cave. Compare the English and Spanish descriptions:

The bottle floated into the cave.

La botella entró en la cueva, flotando.

In English we conflate the manner of motion ("floating") into the verb, leaving the direction of motion of the bottle relative to the cave ("into") as a satellite. In Spanish, it is just the opposite: The direction of motion relative to the cave ("entering") is incorporated into the verb, but the manner of movement ("flotando") is left out. Talmy argues that this pattern is quite general in English and Spanish motion verbs. Other examples are:

The bottle floated out of/floated away from the cave.

La botella salió/se fue de la cueva, flotando.

Thus, these two very similar languages conflate slightly different sets of relationships into their verbs. Even greater differences in conceptual packaging can be seen in the verbs of other languages. In many American Indian languages, the shape of the object that moves (the figure, in Talmy's terminology) is included as part of a transitive verb. For example, "It dirted into the water." is a typical form in Atsugewi. Here "dirted" conveys that the moving object belonged to the dirtlike classification, which also includes ashes, sand, and other similarly constituted materials. This form is analogous to our "It rained into the window," a much rarer pattern in English (Talmy, 1978). In Turkish, an evidential particle that conveys the manner of witnessing the event is included in the verb.

There is evidence, then, for crosslinguistic differences in patterns of lexicalization of relational elements into verbs. But what about nouns? Returning to the bottle in the water, suppose you are standing on the riverbank with a Spaniard and a speaker of an exotic language called Palaver. The bottle bobs by and you say, "The bottle floated into the cave." The Spaniard says, "La botella entró en la cueva, flotando." So far, you will not be too disconcerted, though you may find it slightly odd to think of the bottle as moving floatingly. The Palaverian, however, comments (in English gloss) "The canek is getting smaller," where "canek" means the object composed of the neck of the bottle and the mouth of the cave. The Palaverian has parsed the neck of the bottle and the lip of the cave as a single object, and notes that it is shrinking. This lexicalization, I think, would be truly puzzling, and you might well fail to grasp the meaning. The neck and body of the bottle share close proximity, demonstrate common fate as they move through the water, have continuity of shape, and together display a closed boundary; further, they share color and texture. It is implausible that they could be parsed as belonging to totally different objects.

Our implicit belief, as intuitive linguists, is that any language is overwhelmingly likely to parse the perceptual bits that we refer to as "bottle" into one cohesive object. I believe this intuition is correct: that a language is constrained by the nature of the perceptual world to make coherent lexicalizations

of objects. Further, a one-year-old child standing on the bank would parse the scene into the same collection of objects.

This fixity does not obtain for verbs. Languages may differ markedly in the way in which they conflate subpredicates into verbs and prepositions. As we have seen, English treats the change of location as intimately associated with the manner of the change of location. Spanish treats it as intimately associated with the direction of the change of location of the object relative to another object; Atsugewi associates it with the shape of the object that is moving, and so on. This suggests that when we lexicalize the perceptual world, the assignment of relational terms is more variable crosslinguistically than that of nominal terms.

Cases of crosslinguistic variability in nouns have been noted, such as the many different words for <u>seal</u> in Eskimo; but these differences are often describable in terms of greater differentiation within the same class of objects. Such differences in degree of differentiation do not constitute a radically different parsing of the world, any more than would the presence of more names for different-shaped bottles in Spanish than in English.[6]

The basic decision as to which parts of the scene belong to the seal and which belong to the background is not in question. If Eskimo were found to have a term for, say, the object composed of the head of a seal and the crest of a nearby wave, then this

would constitute a case of crosslinguistic variability comparable to that found for predicate terms. We have, then, the speculation that the referents of verbs are perceptually less constrained, and therefore more variable across languages, than the referents of simple nominals. But why should this be?

Conceptual Cohesiveness

What is needed here is an analytic account of the perceptual nature of objecthood. The Gestalt psychologists proposed that certain relations--such as proximity, common fate, boundedness--between perceptual elements lead people to see them as an integral object. These ideas, although appealing, have lacked an explicit formalization. Recently, however, Palmer (1977) has investigated the role of Gestalt relations in adult object perception. He systematically constructed figures with different degrees of relatedness among their parts. An algebraic measure of goodness of figures and of component parts could be computed, based on explicit definitions of the Gestalt part-part relations. This goodness measure was highly predictive of subject performance on several different tasks, including dividing figures into natural parts, rating the goodness of parts within figures, timed verification of parts within figures, and timed mental synthesis of figures from spatially separated parts. This finding is evidence for the position that the goodness of a figure is predictable from relations among its parts (see also Garner, 1978; Hinton, 1979; Palmer, 1975).

If objecthood is created by spatial relations among perceptual elements, then good concrete objects are particularly cohesive collections of percepts. This line of thinking leads to the speculation that the perceptual elements that are packaged into noun referents are very cohesive (i.e., have many internal relations to one another), while the perceptual elements that are packaged into verb referents are distributed more sparsely through the perceptual field and have fewer internal relations with one another.

From the point of view of language invention, this idea suggests that there are in the experiential flow certain highly cohesive collections of percepts that are universally conceptualized as objects. These highly cohesive collections of perceptual information tend to be lexicalized as nouns by almost every language. Thus concrete nouns are, in a sense, given to us. Children learning language have already pulled out these cohesive packages--the concrete objects and entities--from their surroundings. Because the language they are about to learn will have been constrained to make the same mapping between perceptual field and linguistic description, the child need only match these preconceived objects with co-occurring words. Macnamara (1972) stresses this rather remarkable point that children apparently take a word uttered while pointing at an object as the name of that object as a whole; and not, as would be logically possible as the name for only some parts of the object, or for its color, or for some other aspect of the object (See Quine, 1969). For

relevant empirical work, see Anglin (1977), Gentner (1978b), and Tomikawa and Dodd (1980).

Predicates show a more variable mapping from concepts to words. A language has more degrees of freedom in lexicalizing relations between coherent objects than in lexicalizing the objects themselves, because the sparsity of interrelations allows several equally good conflations. Different patterns of conflation will apply in different languages. One language may include in the verb a semantic component that another language places in a preposition of some other satellite. Moreover, these conflationary patterns are often systematic, occurring across different semantic fields within a given language. Thus, for verbs and other relational terms, children must discover how their language combines and lexicalizes the elements of the perceptual field. As Bloom (in press) and Huttenlocher and Lui (1979) have remarked, verb meanings are learned as part of a system of semantic distinctions. Unlike concrete noun meanings, verb meanings cannot be learned piecemeal, as a series of separate mappings between words and referents.

Acquisition of Predicate Meanings: What to Conflate

Bowerman's (1976, 1977) investigations of her children's semantic errors demonstrate the difficulty children have in knowing how relational terms are constituted in their language. Her children often showed a pattern of early conservatism--during which a relational term would be used correctly in a highly

restricted set of situations--followed by a period of extending the terms. These extensions were often quite novel errors--for example, "You put the pink one to me" (3 years, 4 months, request to be given a pink cup); ". . . put her just a little bit big" (3 years, 0 months, instructions for drawing girl); and "We are surrounded of them" (4 years, 9 months, referring to bubbles in bath). They were still energetically experimenting with extremely frequent relational terms such as "give," "put," and "off" at 5 and 6 years of age.

One particularly clear case in which Bowerman's children developed an implicit hypothesis concerning conflationary patterns was their discovery, at around age 4, that the causative in English is often expressed by a zero-morph. For example, we can say "The door is open." or "Open the door.", using the same surface verb first as a stative and then as a causative ("Cause the door to become open."). At this age, having previously used verbs like "fall" and "drop" correctly for some time, the children began to say things like, "Don't fall that on me." and "Don't eat her, Mommy, she's smelly." (meaning "Don't feed her.") (Bowerman, 1974).

In many cases the children's English errors are standard patterns in other languages. For example, one of Bowerman's daughters referred to turning on the television set as "opening" it. This usage is standard parlance in French. A similar usage was reported by Ed Hutchins (Note 5) when an adult Trobiand Islander asked him to "open" (turn on) his tape recorder.

Another case in which developmental variations resemble crosslinguistic variations occurs for the notion of reversing a verb's action. Bowerman (Note 1) notes that reversal can be lexicalized in English in three ways: by use of the affix un- (for example, load/unload; hook/unhook); with a verb and particle construction (for example, pull on/pull off); or by means of a separate lexical item for the negative conflation (for example, open/close). Although one can to some extent formulate rules for which verbs take each of these kinds of reversal conflation, the rules are neither easy to see nor perfectly regular. As evidence of the arbitrariness, Dutch, with the same options, makes slightly different choices here and there. Dutch parallels English with "ontladen" (unload), but differs, for example, in using "ontglippen" (literally, unslip) instead of our "slip out." Bowerman's children made numerous errors in lexicalizing reversal--e.g., "I'll get it after it's plugged out" (Christy, age 4;3, of an appliance); ". . . I had to untake the sewing" (Christy, aged 5;6, talking about taking stitches out). These spontaneous production errors suggest that children must experiment to discover the patterns of conflation in their language. The difficulty of learning just how underlying relations are packaged into words may underlie the long time course of acquisition of the meanings of verbs and other predicate terms, (e.g., Clark, 1971; Gentner, 1975, 1978a; Kuczaj & Maratsos, 1975).

Bloom's (1973) detailed observations of children's speech in

context provide some evidence for this claim. For example, in one conversation, Gia (age 3) picks up a plastic disc, saying, "Button. Button. Button. Button." and shortly after, struggling to put the disc into her pocket, says "Pocket. Pocket." The investigator asks, "Where is the button? Where are you putting the button?" Gia holds out the disc to the investigator, struggling with the utterance, wanting the investigator to put the disc into her pocket, and says "-bai/behp/beh beh/bai/ . . ." Bloom (1973) concludes: ". . . Gia knows what she wants . . . [but] . . . she cannot express the relationship she wants to exist between the two objects she can name separately without difficulty." To say "Put the button into the pocket." Gia must know that her language requires a separate preposition for directionality (into) but conflates some notion of a goal of the movement with the change of location in "put". The conflation pattern could be different in another language.

It is important to note that the Natural Partitions hypothesis does not assume that relations themselves are perceived later than objects. Indeed, by this account, it is in part the presence of a numerous, enduring set of relations among percepts that defines an object. (For example, "common fate" means that some sets of percepts preserve a constant set of spatial relations with each other even though their relations with the rest of the perceptual field change.) More to the point, even those sparse relations that act as predicates over objects are, I suspect, perceived quite early. Movement, change,

directionality, and so on, seem quite interesting to infants; Bryant (1974) has demonstrated considerable ability to use perceptual relations among young children. It is not perceiving relations but packaging and lexicalizing them that is difficult. What children do not know is how their language combines relations and other subpredicates into word concepts.

Conclusions

We started with the observation that the distinction between nouns and verbs is a universal syntactic division. One appealing interpretation of this division is the Natural Partitions hypothesis, which states that the noun/verb division is originally based on a division in the perceptual world between objects on the one hand and relationships and other predicative notions on the other. If this view is to be taken seriously, it must be evaluated by some means besides the intuitions of adult speakers of English. Otherwise, we cannot discount the Whorfian counterview of Linguistic Relativity: that purely linguistic distinctions may cause us to read corresponding conceptual distinctions into the world. Therefore, in this chapter we examined the words learned first by children in hopes of observing a more direct influence of thought on language.

We found a series of successively more general results: (1) in case studies, children learn nouns before predicate terms; (2) in early production vocabularies, nouns greatly outnumber verbs; and (3) in one systematic study of comprehension, children not

only produced but comprehended many more nouns than verbs at every stage of observation (Goldin-Meadow, et al., 1976). However, the finding that English-speaking children learn nouns before verbs is open to various interpretations. The Natural Partitions hypothesis places the cause in the greater transparency of the mapping between language and the conceptual world for concrete nouns. But an equally defendable position is that the early acquisition of words belonging to the noun category stems from the way in which nouns are treated in language.

There are various possible versions of this Linguistic Relativity counterposition. The most extreme possibility is that the noun-first phenomenon results simply from peculiarities of the English language. This possibility was refuted by examination of early vocabularies from five other languages--German, Kaluli, Japanese, Mandarin Chinese, and Turkish. Nouns predominate over predicate terms in all the languages considered. The crosslinguistic vocabularies seem also to agree reasonably well as to the kinds of objects referred to. This rules out the possibility that the noun predominance in first-word learning is peculiar to English.

But this still does not show that the explanation must lie in the conceptual mapping. It could still be the case that early noun superiority is caused by some purely linguistic factor that these languages all happen to share. Therefore, a series of

specific language-based hypotheses was considered and evaluated: (1) word frequency; (2) word order; and (3) morphological transparency. Also, one other nonconceptual factor was considered: (4) patterns of language teaching. None of these was found to account for the patterns. The languages varied widely on every one of these dimensions, and yet in all cases the number of early nouns in the sample was at least double the number of predicates. It is, of course, possible that there are two or three linguistic factors strong enough to cause the acquisition order, and that different ones of these linguistic factors operated in each of the six languages. This composite explanation cannot be definitively disproved without more crosslinguistic comparisons. But although the language-based factors must surely have an effect,[7] explaining the patterns solely by these factors has now become more cumbersome than invoking conceptual differences. It is time to lay aside the purely linguistic explanations and investigate the conceptually based explanation.

The Natural Partitions account has it that children learn concrete nouns early because, as object-reference terms, they have a particularly transparent semantic mapping to the perceptual-conceptual world. By this account, humans, even prelinguistic infants, inevitably see some parts of the perceptual world--the "objects"--as particularly coherent and stable. Words that refer to these concepts are easy to learn because the child has already formed object concepts, and need only match words and concepts.

Verbs and other predicate words, however, have a less transparent relation to the perceptual world. Verbs--even "concrete verbs" like "float" or "move"--have fewer psychological constraints on their possible conflationary patterns than do concrete nouns. This means that a language is relatively free in its choice of a system of relational meanings, and this in turn means that a child learning the language is less able to guess those meanings purely by knowledge of the world. This claim is supported both by the crosslinguistic variability in conflation patterns and by the errors in conflation observed in children learning relational terms. To put it strongly, object concepts are given to us by the world and can be learned one at a time; predicate concepts form a system that must be invented or, from the child's point of view, discovered. Thus, the slower acquisition of verbs results from the fact that the child must discover both how to conflate subpredicates into concepts and how to match these concepts with words.

One important limitation here is that the arguments and evidence for the Natural Partitions hypothesis can properly apply only at the perceptual level. The conceptual characterization of nouns as object-reference terms applies only to a subset of nouns: essentially, to concrete and proper nouns. Only there do we find sets of percepts that are so richly interrelated that they are virtually certain to be conflated together as objects. This limitation has not been a problem here, because children's early experience presumably centers around just those kinds of

concrete percepts. The nouns that appear in the early vocabularies are virtually all either concrete or proper nouns. However, once we move to more abstract domains, there are many more possibilities for conflationary patterns. In abstract domains, not only the predicate terms but also the nominals can be variably selected. We can say either "The price increased." or "There was an increase in what things cost." (Compare this to the unnaturalness of the analog in the perceptual domain: "The dog ran." vs. "There was runningness in what was being canine.")

Despite these differences between concrete and abstract domains, the noun-verb distinctions, once encoded syntactically, can be extended into abstract conceptual realms as well. One may ask whether, when this happens, cognitive differences appropriate to the perceptual categories carry over into the abstract realm: whether naming some substructure by a noun or verb gives it object-like or predicate-like privileges. For example, conferring nounhood on a complex situation such as war or blame may allow speaker and listener to think of it as a cohesive whole, and to make further predications about it. This kind of strong reification, if it occurs, might fit the Whorfian hypothesis after all. But such reification, if it occurs, requires additional assumptions beyond those of the Natural Partitions hypothesis. It would be hard to argue, for example, that the noun "blame" refers to a better object, or even to a more cohesively interrelated set of subconcepts, than the verb "blame."

Thus, in the acquisition of form-class distinctions, the Natural Partitions hypothesis prevails in the early distinction between concrete nouns and predicate terms. However, its role diminishes when it comes to later acquisition of distinctions among different classes of predicates, such as verbs and adjectives. Here the relation between language and thought moves more towards Linguistic Relativity, since the perceptual world offers only very weak constraints on form class assignment. These patterns must be learned from the language itself, as in the Maratsos and Chalkley account. Finally, at the level of completely abstract discourse, Linguistic Relativity becomes still more pronounced: Even the noun-predicate distinction is largely unconstrained. Indeed, it is possible that in abstract discourse the stronger form of the Whorfian hypothesis, Linguistic Determinism, may have its day. Consider a case in which a given concept can be lexicalized either as a nominal or a predicate, (as in our earlier example of "an increase in cost" versus "costs increased"). It is intriguing to speculate that when people interpret an abstract text, they carry over conceptual habits from perceptual domains, so that "cost" expressed as a noun is treated as more cohesive and more stable than "cost" expressed as a verb or preposition (see Gentner, 1981).

Yet, although the role of the Natural Partitions hypothesis is limited, it may nevertheless be an important one. Object-reference mappings may provide natural entry points into

language--an initial set of fixed hooks with which children can bootstrap themselves into a position to learn the less transparent aspects of language.

APPENDIX A

Sources for Early Vocabularies

Kaluli

The data from Kaluli were obtained from Bambi Schieffelin (Note 6), and consist of her translations into English of the vocabularies derived from transcriptions of two one-hour tape-recorded sessions with each of the two children included here. The children were native Kaluli-speaking children from Papua New Guinea, and were recorded in and around their homes by Schieffelin. Notice that these data do not represent a total vocabulary count, but rather a representative count.

Mandarin Chinese. The data from Mandarin Chinese were obtained from Mary Erbaugh (Note 2). Here the vocabulary count represents translations into English of utterances, transcribed during observation sessions of the children, speaking their native Mandarin Chinese in their homes in Taiwan. Again, this is a representative count, not a total cumulative vocabulary count. However, in this case, it is of interest that the parents of one child, when asked to give her vocabulary, named most of the words that were recorded for the child and named no words that were not recorded. Moreover the frequency of form classes named by the parents was quite close to that obtained in the transcription. Thus, at least in this case, this distribution of form classes is

roughly equivalent to the distribution that would be found if the parent's report of the child's total vocabulary had been used.

Japanese. The data from Japanese children were obtained from four Japanese-American families living in San Diego, and collected by Jorge Marrero and Edna Sullivan, with the help of Naomi Miyake, all students at U.C.S.D. In this case, the data were each mother's report of her child's entire vocabulary. the method was to interview the principal caretaker (who happened to be the mother in each of the four families) asking her to give every word that the child spoke, together with an English gloss of their meaning. In all cases, the parents spoke Japanese in the home, and both parents were Japanese-speaking. Many of the children had one or two words of English, but in all cases, the bulk of their vocabulary was Japanese. Thus these data represent parent's reportings of their children's total cumulative vocabularies. For two children, the mothers spent several hours the day after the first interview adding words and notes, so these reports are probably more complete.

German. The two German children were studied in the same retrospective report manner as the Japanese children: researchers interviewed the parents, and obtained from them their reports of the cumulative vocabularies of their children.

English. In the case of Tad, the child's mother kept a journal of the child's new vocabulary items as he learned them.

For much of this period I (the author) was in nearly daily contact with the child and helped in the maintenance of the journal. Thus the data for Tad represents a fairly close word-by-word description of the child's vocabulary acquisition, with fairly complete notes on the way in which the child used the terms.

The data from Mollie were recorded as the child was learning vocabulary, and her father reported new vocabulary acquisitions at roughly semi-weekly intervals during the crucial period for which the vocabulary was recorded. Thus this collection too represents a fairly close account of the child's cumulative vocabulary.

The data for Dewey A were taken from Dewey (1894), who monitored the vocabulary of a child (presumably his own). He does not describe his method for collecting this data.

The data for Scooter were collected by her father, Charles Jackson, who listed all words spoken by Scooter at intervals in the child's development. These data thus fall between a cumulative daily journal and a retrospective report.

Turkish. The data for the Turkish children were communicated to me by Dan Slobin (Note 7). The data were collected by Nail Sahin in Turkey, and consists of English translations of the vocabulary items used in a transcribed taping session. Thus, like the Kaluli and Mandarin Chinese data, these

data are a representative sample, albeit one including several taping sessions, rather than the total vocabulary.

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[1] There are two caveats to notice here: First, the dichotomy here is between object-reference and predication; whether the predication is of states, actions, relationships or attributes is a secondary question. The corresponding syntactic contrast is between the category of nouns and a composite predicate category composed of verbs, prepositions, adjectives, and adverbs. Thus,

the "noun/verb" distinction is a kind of shorthand for "noun/composite category of predicate terms." The justification for lumping together syntactic classes--verbs, adjectives, prepositions--as will emerge in this paper--is that the distinctions among predicate classes are rather fluid compared to the distinction between nominals and predicates.

The second point is that this postulated conceptual correspondence must clearly be taken as a distributional trend or central tendency, which is most clearly manifested at the perceptual level. There are many exceptions, particularly among abstract words. For example, although object-reference terms are almost always nouns, the reverse is not true: There are many nouns (e.g., beneficiary) that convey relational meanings. Again, although verbs and prepositions prototypically convey relational predicative concepts (e.g., give and in), relational meanings can also be conveyed by other kinds of words, including adjectives (e.g., edible, richer) and adverbs (e.g., better); and there are verbs, such as hammer, that tend to convey object information (here, the instrument). (See also the discussion of Maratsos and Chalkley's (in press) work.)

[2] In the early vocabularies, I have categorized predicates according to apparent use by the child, rather than going by their adult form class. Thus, down is considered as a relational term because the child initially used it to request a change of state. Had he used it as a stative modifier, to describe the position of an object, it would have been scored as an adjective.

[3]A possible confounding is that more nouns than verbs were tested; there were 70 nouns and 30 verbs. This, of course, could have led to the apparent noun superiority. However, there are reasons to believe that the noun superiority was a real one, and not an artifact of the item selection. First, the sample words were selected on the basis of pilot work in which Seligman followed several two-year-old children for five to eight consecutive days, assessing as exhaustively as possible their entire receptive and productive vocabularies. Thus the form-class asymmetry in the sample reflected an asymmetry found in the subject population. Second, the children were very far from ceiling level in comprehension and production of both categories; it could not be argued that the children were prevented from demonstrating their full knowledge of verbs by being tested on only a subset of their vocabulary. Thus, as long as we accept (on the basis of Seligman's pilot work) that the verb and noun samples were equally representative of the children's vocabularies, the noun superiority result can be trusted.

[4]Dan Slobin and Catherine Snow have independently pointed out to me that if we consider language spoken to children, German may have more verb-final sentences than Turkish. Many of the forms commonly used with children, such as those involving modals or questions, are verb final. e.g., "Du musst dein fruestuck essen." ("You must eat your breakfast."); or "Was hast du gesehen?," ("What have you seen?"). In Turkish, sentences to

children are often in OVS form, in which a nonfocused subject is placed after the verb.

[5] I thank Bambi Schieffelin for calling this possibility to my attention.

[6] Indeed, cross-cultural comparisons of biological taxonomies indicate considerable crosslinguistic overlap in the hierarchies (Berlin, Breedlove, & Raven, 1973; Stross, 1973).

[7] In particular, more research needs to be done on the relation between motherese and acquisition order in different languages. Patterns of stress, deletion, or repetition in the input language to children may affect acquisition order, but more data is required to decide. (However, see Gleitman & Wanner, in press).